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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/089,238	03/28/2002	David Raybone	RAYBONE-15438	4577

7590 06/17/2004  
William H Holt  
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Alexandria, VA 22314

EXAMINER

VERSTEEG, STEVEN H

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 06/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/089,238

Applicant(s)

RAYBONE ET AL

Examiner

Steven H VerSteeg

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 March 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 23-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 23-42 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 March 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner..
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

1. New claims 21-40 have been renumbered as claims 23-42 under Rule 126. Please take note of the renumbering in your response.

#### ***Claim Objections***

2. Claims 29, 36, and 38-42 are objected to because of the following informalities: claims 29 and 42 utilize improper Markush terminology in lines 2-3 and should be “one or more materials selected from the group consisting of”; “bed or beds” should be “beds” in line 2 of claim 36 because there is no indication in claim 23 from which claim 36 depends that only one “bed” be present; “n” should be “in” in claim 38 at line 11. Claims 39-42 depend from claim 38 and contain all of the limitations of claim 38. Therefore, claims 39-42 are objected to for the same reasons as claim 38. Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 23-42 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The entirety of claims 23-27, 33, and 38-40 are considered to be new matter. Adequate support for the claims could not be located in the specification. Please indicate, by page and line number, where support for the subject matter exists. Claims 28-32, 34-36, and

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claims 41 and 42 depend from claim 23 or claim 38 and contain all of the limitations of claim 23 or claim 38. Therefore, claims 28-32, 34-36, 41, and 42 are rejected for the same reasons as claim 23 or claim 38.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 23-42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 23 recites the broad recitation "carbonaceous particulates, and the claim also recites "including soot" which is the narrower statement of the range/limitation.

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8. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 23 recites the broad recitation "other residual constituents", and the claim also recites "including oxygen" which is the narrower statement of the range/limitation.

9. Claims 24-37 depend from claim 23 and contain all of the limitations of claim 23. Therefore, claims 24-37 are rejected for the same reasons as claim 23.

10. Regarding claim 29, the phrase "such as" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

11. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10

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USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 30 recites the broad recitation "carbonaceous particulates", and the claim also recites "including soot" which is the narrower statement of the range/limitation.

12. Claims 31 and 32 depend from claim 30 and contain all of the limitations of claim 30. Therefore, claims 31 and 32 are rejected for the same reasons as claim 30.

13. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 34 recites the broad recitation "carbonaceous

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particulates”, and the claim also recites “including soot” which is the narrower statement of the range/limitation.

14. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by “such as” and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 34 recites the broad recitation “aromatic hydrocarbons and derivatives thereof”, and the claim also recites “including poly aromatic hydrocarbon compounds” which is the narrower statement of the range/limitation.

15. Regarding claim 34, the phrase “such as” renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

16. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10

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USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 34 recites the broad recitation "sulphur compounds", and the claim also recites "including SO<sub>2</sub> and sulphates" which is the narrower statement of the range/limitation.

17. Claim 35 depends from claim 34 and contains all of the limitations of claim 34.

Therefore, claim 35 is rejected for the same reasons as claim 34.

18. Claim 37 lists the reactor as a "dielectric barrier discharge type reactor". The word "type" renders the limitation unclear.

19. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd.



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App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 38 recites the broad recitation “carbonaceous particulates”, and the claim also recites “including soot” which is the narrower statement of the range/limitation.

20. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by “such as” and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 38 recites the broad recitation “other residual constituents”, and the claim also recites “including oxygen” which is the narrower statement of the range/limitation.

21. Regarding claim 38, the phrase “such as” renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

22. Claims 39-42 depend from claim 38 and contain all of the limitations of claim 38. Therefore, claims 39-42 are rejected for the same reasons as claim 38.

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23. Regarding claim 42, the phrase "such as" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

*Claim Rejections - 35 USC § 102*

24. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

25. Claims 23, 27-31, 33, 36, 38, and 40-42 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6,475,350 B2 to Palekar et al. (Palekar).

26. For claim 23, Applicant requires a method of treating gases which contain nitrogen oxides, carbonaceous particulates including soot, hydrocarbons, and other residual constituents including oxygen, which method comprises passing the gases through a reactor comprising a bed of active material in an enclosure having gas flow conduits for directing gas flow through or over the bed of active material, applying an electrical potential to generate a non-thermal plasma in gas permeating the active material, at least a component of the active material being such as to adsorb or trap carbonaceous particulates including soot, the electrical potential being applied to generate the non-thermal plasma during passage through the active material of the gases undergoing treatment whereby the trapped carbonaceous particulates including soot have a longer effective residence time in the non-thermal plasma relative to the species in the gas flow

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which are not adsorbed or trapped and are oxidized by oxidative species present in the gases while conversion of NO to NO<sub>2</sub> is much less likely to occur.

27. For claim 38, Applicant requires a non-thermal plasma reactor for the treatment of gases, which contain nitrogen oxides, carbonaceous particulates including soot, hydrocarbons, and other residual constituents including oxygen, which reactor comprises a bed of active material in an enclosure having gas flow conduits for directing gas to flow through or over the bed of active material, electrodes adapted when electrically energized to generate non-thermal plasma in the gas permeating the active material, at least a component of the active material being such as to adsorb or trap carbonaceous particulates including soot in the gas flow, wherein in operation of the reactor, the active material increases the effective residence time in the non-thermal plasma of the carbonaceous particulates including soot relative to the residence time of the species in the gas flow which are not adsorbed or trapped, and the trapped carbonaceous particulates including soot are oxidized by oxidative species present in the gases while conversion of NO to NO<sub>2</sub> is much less likely to occur, and an NO selective catalyst is additionally provided for selectively adsorbing both NO and hydrocarbons and/or partially oxygenated hydrocarbons, and promoting their reaction together to reduce NO directly to N<sub>2</sub>.

28. Palekar discloses an apparatus and method for removing pollutants from gas steams (abstract) such as exhaust gases from an internal combustion engine (col. 4, l. 62-66). Because it is for exhaust from an internal combustion engine, inherently the gases contain nitrogen oxides, carbonaceous particulates including soot, hydrocarbons, and other residual constituents including oxygen. The gases are passed over a bed of catalyst 2 while electrical potential is applied to electrodes 4a and 4b to generate non-thermal plasma so that there is a longer residence time in

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the non-thermal plasma relative to species in the gas flow that are not adsorbed or trapped and are oxidized by oxidative species present in the gases while conversion of NO to NO<sub>2</sub> is much less likely.

29. For claims 27 and 40, Applicant requires the bed of active material to be beads of alumina. Palekar uses beads of alumina (Experiment III).

30. For claims 28 and 41, Applicant requires a combustion catalyst. For claims 29 and 42, the combustion catalyst can be an alkali metal oxide. Palekar uses a combustion catalyst such as magnesium oxide (col. 12, l. 11-13).

31. For claim 30, Applicant requires oxidation to carbon dioxide and carbon monoxide of the carbonaceous particulates including soot to occur at temperatures lower than the respective thermal oxidation temperature thereof. For claim 31, Applicant requires the temperature to be lower than 250 Celsius. Palekar discloses the temperature to be 77 Fahrenheit (col. 9, l. 31-67).

32. For claim 33, Applicant requires the gases to be subject to flow through or over a plurality of beds of active material each of which adsorbs or traps a different predetermined chemical species. Palekar uses several different beds (col. 12, l. 11-21).

33. For claim 36, Applicant requires the bed to be spheres. Palekar uses beads that are spherical (Experiment III).

### ***General Information***

For general status inquiries on applications not having received a first action on the merits, please contact the Technology Center 1700 receptionist at (571) 272-1700.

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For inquiries involving Recovery of lost papers & cases, sending out missing papers, resetting shortened statutory periods, or for restarting the shortened statutory period for response, please contact Denis Boyd at (571) 272-0992.


For general inquiries such as fees, hours of operation, and employee location, please contact the Technology Center 1700 receptionist at (571) 272-1300.

*Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H VerSteeg whose telephone number is (571) 272-1348. The examiner can normally be reached on Mon - Thurs (6:30 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Steven H VerSteeg  
Primary Examiner  
Art Unit 1753

shv  
June 14, 2004